

Patent claims

1. Ceramic/metal substrate, especially multiple substrate with a ceramic plate or layer (2) that forms at least two substrate areas that are connected to each other as one piece and have at least one metal surface (3', 3'', 3'''; 4', 4'', 4''') on at least one surface side of the ceramic layer (2) and join each other on at least one predetermined break line (8, 9) provided for in the ceramic layer, **characterized in that** the at least one metal surface (3', 3'', 3'''; 4', 4'', 4''') of each substrate areas possesses at least one edge reduction (10) on one edge adjacent to the predetermined break line (7, 8) and running along this predetermined break line (7, 8) and that the edge reduction (10) is of a form that the mass of metal there per volume unit (specific metal mass) is reduced to 10 to 80 %, with reference to the specific metal mass of the metal surface outside of the edge reduction (10).
2. Ceramic/metal substrate according to claim 1, characterized in that the metal surfaces of the substrate areas are formed by at least one textured or structured metalization (3, 4) on at least one surface area of the ceramic layer (2).
3. Ceramic/metal substrate according to claim 1 or 2, characterized in that the at least one metalization is produced by applying a metal layer or metal foil in a heat process, e.g. by means of the DCB or active soldering process.
4. Ceramic/metal substrate according to one of the foregoing claims, characterized in that at least part of the substrate areas are single substrates of the multiple substrate.
5. Ceramic/metal substrate according to one of the foregoing claims, characterized in that the width (a) of the edge reduction or of the reduced metal mass area is approximately 0.2 to 6 mm.
6. Ceramic/metal substrate according to one of the foregoing claims, characterized by at least one outer metal surface (3'', 3'''; 4'', 4''') that is provided for on at least one surface of the ceramic layer (2) at least along one edge (5, 6) of



the ceramic/metal substrate, and by at least one predetermined break line (7, 8) between this outer metal surface and adjacent substrate areas, whereby also the at least one outer metal surface (3'', 3'''; 4'', 4''') has an edge reduction (10) along the predetermined break line (7, 8).

7. Ceramic/metal substrate according to one of the foregoing claims, characterized in that the edge having the edge reduction has a distance (d1, d2) from the adjacent predetermined break line (7, 8) or a plane (SE) of this predetermined break line that is considerably less than 1 mm.
8. Ceramic/metal substrate according to one of the foregoing claims, characterized in that the edges with the edge reduction have a distance from the respective predetermined break line (7, 8) of approximately 0.05 to 1 mm.
9. Ceramic/metal substrate according to one of the foregoing claims, characterized in that the metalizations or the metal surfaces formed by these have a thickness of between approximately 0.15 to 1 mm.
10. Ceramic/metal substrate according to one of the foregoing claims, characterized in that the edge reduction is formed by beveling (11) of the respective edge, for example by beveling that forms an angle smaller than 45° with the plane of the ceramic layer (2).
11. Ceramic/metal substrate according to one of the foregoing claims, characterized in that the edge reduction is formed by hollows or depressions (12, 13, 14, 16) in the material of the metal surface.
12. Ceramic/metal substrate according to claim 11, characterized in that the hollows or depressions are formed continuously, i.e. extend to the surface side of the ceramic layer (2) adjacent to the metal surface.
13. Ceramic/metal substrate according to one of the foregoing claims, characterized in that the hollows or depressions (12, 13, 14, 16) are formed in such a way that

metal from the metal surface remains on the surface side of the ceramic layer or plate adjacent to the respective metal surface.

14. Ceramic/metal substrate according to one of the foregoing claims, characterized in that the edge reduction is formed by a number of hole-like depressions (12, 13) that preferably are arranged as a row of holes.
15. Ceramic/metal substrate according to claim 14, characterized by outer and inner depressions (12, 13) forming an outer and a second inner row of holes respectively.
16. Ceramic/metal substrate according to one of the foregoing claims, characterized in that the depressions have a diameter of approximately 0.5 to 0.6 mm.
17. Ceramic/metal substrate according to claim 15 or 16, characterized in that the depressions (12) forming a single row of holes have a diameter of 0.5 mm, with a width of the edge reduction of approximately 0.8 mm and with a distance of the edge from the predetermined break line of approximately 0.5 mm.
18. Ceramic/metal substrate according to one of the foregoing claims, characterized in that with several rows of holes (12, 13) the depressions or holes of the outer row of holes have a diameter that is larger than the diameter of the depressions of the inner row of holes, whereby the diameter of the depressions of the outer row of holes is, for example, approximately 0.6mm and the diameter of the depressions of the inner row of holes is approximately 0.4 mm and the width of the edge reduction is, for example, approximately 1.4 mm.
19. Ceramic/metal substrate according to one of the foregoing claims, characterized in that the edge reduction is formed by a groove-shaped depression (16).
20. Ceramic/metal substrate according to one of the foregoing claims, characterized in that the edge reduction is formed by a graduation (15) in at least one partial area.

21. Ceramic/metal substrate according to one of the foregoing claims, characterized in that at least in the area of the single substrate on both surfaces of the ceramic layer (2) at least one metal surface (3', 4') is provided for and that the metal surfaces (4') have, on a first surface area, for example on the bottom of the ceramic/metal substrate, an edge distance (d1) from the adjacent predetermined break line (7, 8) or its plane which edge distance is smaller than the edge distance (d2) of the metal surfaces (3') on the second surface area, for example on the top of the ceramic/metal substrate.
22. Ceramic/metal substrate according to one of the foregoing claims, characterized in that with several substrate areas or single substrates arranged in several rows, two groups of crossing predetermined break lines are formed (7, 8).
23. Ceramic/metal substrate according to one of the foregoing claims, characterized in that on at least one surface area of the ceramic/metal substrate all edges of the metal surfaces adjacent to a predetermined break line (7, 8) are provided with edge reduction (10).
24. Ceramic/metal substrate according to one of the foregoing claims, characterized in that the metal surfaces on at least one surface area of the ceramic layer (2) has no edge reduction (10) on edges that are adjacent to a group of predetermined break lines (8).
25. Ceramic/metal substrate according to one of the foregoing claims, characterized in that the single substrates formed by substrate areas are not provided with components.
26. Ceramic/metal substrate according to one of the foregoing claims, characterized in that the single substrates formed by substrate areas are provided with electric components (20).